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## New Salamanders from Costa Rica

BY

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ABSTRACT.—A short review of the known species of salamanders of Costa Rica is given, and four new species are described. These are *Magnadigita nigrescens*, *Bolitoglossa palustris*, *Parvimolge richardi* and *Oedipina serpens*.

The known salamander fauna of Costa Rica consists of some ten plethodontid species representing several genera. One other species, *Oedipina collaris*, has been reported both in Nicaragua (its type locality) and Panamá, and it may be expected in Costa Rica if its range is continuous.

The following species have been taken, or at least reported in Costa Rica:

*Pseudoeurycea? picadoi*  
*?Bolitoglossa platydactyla*  
*Bolitoglossa lignicolor*  
*Bolitoglossa striatula*  
*?Bolitoglossa flaviventris*

*Magnadigita robusta*  
*Magnadigita subpalmata*  
*Oedipina uniformis*  
*Oedipina alfaroi*  
*Haptoglossa pressicauda*

Cope (1876) reported a specimen of *Oedipus morio?* "a partly preserved specimen from the eastern slope of the Pico Blanco." This has been referred to the synonymy of *Oedipus subpalmatus* [= *Magnadigita subpalmata*] by Dunn (1926). Again Cope (1887) lists *Oedipus morio* and includes with the above reference a report of a specimen collected by Zeledon on the "Plateau of Costa Rica."

Günther (1902) reports a species which he designates as *Spelrpes morio* from the plateau of Cartago (Zeledon collector), and seemingly refers to the same material mentioned above. Dunn (1926) has referred this reference to the synonymy of what Dunn designates as *Oedipus morio* (corrected by Schmidt, 1933) to *Oedi-*

*pus dunnii*. Since the reference also contains specimens from Mexico and Guatemala it is not certain whether one may accept the species *dunnii* as a part of the Costa Rican fauna or not.

*Bolitoglossa platydactyla* (*Spelerpes variegatus*) is reported from San Carlos, Costa Rica, by Günther (1902). Dunn (1926) states that he has examined this species and that he identifies it as being *Oedipus platydactyla*. He also identifies two British Museum specimens from Medellín, Colombia, as *O. platydactyla*. If they are correctly identified the extent of the range (from Eastern San Luis Potosí, Mexico, to Medellín, Colombia) is greater than that of any other Central American salamander. He does suggest the possibility that these specimens "may represent an undescribed form." Cope reports the species as *Oedipus variegatus* from Buenos Ayres in southwestern Costa Rica.

A specimen purporting to be from Miravalles, Costa Rica, was referred by Dunn (1926) to *Oedipus salvinii*. Schmidt (1936) has shown that Dunn has confused *Oedipus flaviventris* Schmidt with *Oedipus salvinii* and places *Oedipus salvinii* Dunn (part) in the synonymy of the latter. The Costa Rican specimen agrees with *flaviventris* in having the venter "light." Schmidt does not make specific mention of the Costa Rican specimen, but I suspect it should be regarded as *flaviventris* until proved to the contrary. The remaining species of the list seem to be unquestionably a part of the Costa Rican fauna.

*Pseudoeurycea? picadoi* (Stejneger). The type of this species is from La Estrella, southeast of Cartago, Costa Rica. Specimens have been taken at La Palma, and certain of the type series of *subpalmatus* are said to be of this species (Dunn, 1926, p. 380).

*Bolitoglossa lignicolor* (Dunn) has been reported, by Dunn (1926), on the basis of a single specimen from Sarapiquí, Costa Rica. The type locality is Chiriquí, Panamá.

*Bolitoglossa striatulus* (Noble) originally described from Cukra, near Bluefields, Nicaragua, is known from a specimen from Turrialba, Costa Rica, and two specimens from Surubres, Costa Rica (Dunn, 1926).

*Magnadigita robusta* (Cope) was originally described from the slopes of Volcan Irazú, Costa Rica. This is a well-known species and is the largest salamander species occurring in the country.

*Magnadigita subpalmatus* (Boulenger) was originally described from La Palma, Costa Rica. It is a well-established form but there

is a strong probability that in the literature specimens of other species have been referred to it erroneously.

*Oedipina uniformis* (Keferstein) was originally described from "Costa Rica." Numerous specimens have been reported. Here again it seems probable that other species have been confused with it in the literature.

*Oedipus alfaroi* Dunn, is known from the type, from Zent, and two specimens from Suretka, Costa Rica.

*Haptoglossa pressicauda* Cope is known only from the type, which is now lost.

Günther, in compiling the Reptilia and Batrachia, of the Biologia Centrali-Americana, probably had no more than a dozen specimens from Costa Rica. Dunn, in his "Plethodontidae," lists about 114 specimens from Costa Rica in the material available to him in 1926. All are placed in the preoccupied genus *Oedipus*. This material was distributed as follows:

16 <i>robustus</i>	1 <i>lignicolor</i>
7 <i>picadoi</i>	3 <i>striatula</i>
49 <i>subpalmatus</i>	1 <i>alfaroi</i>
1 <i>flaviventris</i> ( <i>salvini?</i> )	36 <i>uniformis</i>

Besides these, Dunn examined the following Costa Rican specimens: 1 *robustus*, 1 *subpalmatus* and 14 *uniformis* including the type of *Opheobatrachus vermicularis* Gray in the British Museum of Natural History, and mentions that there were other specimens not examined (perhaps some of which may have been from Costa Rica).

In the collection made by the Austrian Biological Expedition of 1930, reported by Wetstein\* three species are reported: *subpalmatus*, 10 specimens; *picadoi*, 1; *uniformis*, 1.

The collections made in the summer of 1947 by Richard C. Taylor and myself contain representatives of only four of the known species. No specimens of the reported forms *Bolitoglossa platydactyla*, *B. flaviventris*, *Pseudoeurycea? picadoi*, *Oedipina alfaroi* or *Haptoglossa pressicauda*, were found. However, numerous specimens of the known *Magnadigita robusta*, *Magnadigita subpalmata*, *Bolitoglossa striatula* and *Oedipina uniformis* were taken; several others were discovered that are believed to represent undescribed species. A part of these are treated in the following pages.

\* Sitz. Akad. Wiss. Wien Abt. 1, Bd. 143, Heft. 1, 2, 1934, pp. 1-39, 9 text figs.

*Magnadigita nigrescens* sp. nov.

*Type:* University of Kansas Museum of Natural History no. 23816, collected at Boquete Camp (on highway between Millville and San Isidro El General), Costa Rica, elevation 6,000 ft., Aug. 17, 1947, by Edward H. Taylor.

*Diagnosis:* Uniformly blackish brown above, slaty black on sides and ventral surfaces; hand and foot webbed, the terminal joint of truncate digits free of web except that of inner digit; thirteen costal grooves; nostril small; paravomerine teeth in a single patch, notched behind; 11-11 vomerine teeth, arranged partly in two series, beginning outside level of choanae, the two series separated by twice the diameter of choanae; no sublingual fold; maxillary teeth reduced, 7-9.

*Description of the type:* Adult ♀; head broad, the snout bluntly rounded, somewhat truncate; a slight swelling on lip below nostril; eye moderate, its diameter longer than snout; posterior part of eyelids fit under a diagonal fold; a strong gular fold on neck with a nuchal groove arising from each side, which meets its fellow on the middorsal line of the neck; anterior to gular fold, a groove completely crosses chin and ascends either side, crossing behind angle of mouth and terminating at the postorbital groove; latter arises at eye, and extends back but does not reach to nuchal groove; a small lateral groove in front of the nuchal groove which reaches to the middorsal line; thirteen costal grooves counting those in axilla and groin; adpressed limbs separated by between two and one half to three costal folds; fold of the posterior extension of the hyoid apparatus reaches second costal fold; tail regenerating presumably, a basal constriction on tail; walls of cloaca with smooth folds; glandular area behind insertion of leg not especially distinct.

Skin generally smooth, but area on snout and interorbital region somewhat rough; venter crossed by very numerous fine striations.

Limbs rather short, the very broad digits united by a web, almost palmate, the terminal joint of the digits, other than the inner, subtruncate, with terminal joint free and with a small pad present below tip; between toes the web may be slightly excised.

Floor of mouth without a free sublingual fold; choanae very small, their diameter contained in distance between them about six times; paravomerine teeth in a single elongate patch widening gradually posteriorly and notched behind, anteriorly narrow and, save for two or three scattered teeth, widely separated from the vomerine teeth; the vomerine series of about eleven teeth begin beyond the

outer level of the choanae and curve back, separated from each other by a distance equal to twice diameter of choanae; each series arranged partially in two rows; mandibular teeth small, 7-9 almost covered by gums; only a single premaxillary tooth present; 25 mandibular teeth on each side of jaw.

The tail (regenerated) is shorter than head and body, with eighteen caudal grooves present; width of head in head body length, 5.2 times; length of head to gular fold (lateral) in head body length, 3.9 times.

*Color:* In life nearly uniform slate black above and below; in preserved state the dorsal color is dark brown, the sides slate black, the venter blackish brown; under side of limbs lighter brown; under side of hands and feet grayish white; chin lighter brown than body.

*Measurements (in mm.):* Total length (tail regenerated), 70; snout to arm, 15; snout to end of vent, 46; axilla to groin, 25; arm, 9.8; leg, 10.1; head width, 8.8; head length to gular fold (lateral), 11.8; head length to gular fold (median), 11.8.

*Remarks:* Only a single specimen of this species was taken. It was obtained from within the naturally hollow stalk of a large-leaved plant. The entrance had been gained through a hole bored by an insect. It was found nearly a meter below the point of entrance when the stalk was accidentally split.

The curious reduction of the maxillary teeth occurs in no other species of the genus that I have examined and I am uncertain as to its closest relationship.

*Bolitoglossa palustris* sp. nov.

*Type:* University of Kansas Museum of Natural History, no. 23817, collected at San Isidro el General, August 23, 1947, by Edward H. Taylor.

*Diagnosis:* A member of the *rufescens* group, with a short broad head; fully webbed or palmate hand and foot; vomerine teeth 16-18 on strongly elevated ridges, in more than a single series beginning about level of middle of choanae; choanae large; maxillary teeth 14-14; premaxillary teeth 4; no free sublingual fold under tongue; costal grooves indistinct, probably 13; tail much shorter than head and body.

*Description of type:* Snout moderately short, truncate, moderately elevated above the mouth; subnarial swellings small distinct; nostril small; canthus rostralis rounded, the loreal region sloping abruptly to lip; diameter of eye greater than length of snout,



about equal to its distance from middle of tip; surface of snout on a level with interorbital and occipital surfaces; interorbital width, equal to twice width of eyelid; upper eyelid not overlapping lower behind eye, the ends not fitting in a small groove; no orbitolabial groove; a postorbital groove or depression reaching back to a vertical groove from side of chin which crosses the angle of jaw but fails to reach the top of head, nor is it continuous across chin; a very well-defined gular fold, but grooves from ends of fold not or scarcely traceable on sides of neck, and definitely not reaching to median nuchal line; angle of mouth reaching slightly behind level of orbit; posterior extension of hyoid element forming a very strong fold which reaches back of arm insertion half the length of arm.

Maxillary teeth 14-14 (possibly two or three more as evidenced by breaks in the continuity of the series); 4 premaxillary teeth; vomerine teeth, 16-18; teeth arranged in more than a single irregular row beginning at the level of middle of choanae, and curving slightly, separated from its fellow by a distance equal to greatest diameter of choanae; their diameter contained in distance between them, three and one half times; paravomerine teeth in a single subtriangular patch, the length only about a third greater than width, not notched behind, separated from the vomerine series by a distance greater than half distance between choanae, teeth strong forming typical chevron-shaped series; some pigment evidence in anterior palatal region at side of paravomerine teeth and on floor of mouth anterior to tongue.

Dorsal surface of back rather rough; side and venter smooth; costal grooves not very distinct, apparently 13 present; adpressed limbs separated by  $3\frac{1}{2}$  folds; a constriction at base of tail; 25 caudal grooves are present; tail tetragonal in cross section compressed posteriorly, with a subcaudal groove present; anal folds present on sides of cloaca; small glandular area behind insertion of hind limb, dark in color.

*Parvimolge richardi* sp. nov.

*Type:* R. C. T.\* no. 1436 collected at Isla Bonita (American Cinchona Plantation), Atlantic slope of Volcán Poas at an elevation of about 6,500 feet; Aug. 1, 1947, by Richard Clark Taylor.

*Diagnosis:* A member of the genus *Parvimolge*, but differing from *Parvimolge townsendi* in the absence of the series of enlarged dorsal glands, but agreeing in the ossification of the skull and the modification of the digits, diminutive body size, moderately enlarged nos-

tril, presence of maxillary teeth, and absence of an orbito-labial groove.

Snout rather pointed; digits grown together, tips of fingers and toes pointed; tail not constricted at base; chin with an arched groove; nostrils enlarged; thirteen costal grooves; five to six costal folds between adpressed limbs; paravomerine teeth in a single patch, not notched behind; vomerine teeth on strongly elevated ridges; twelve maxillary teeth on each side; six premaxillary teeth.

*Description of type:* Female; snout bluntly pointed; eye very large, its horizontal diameter a little more than one and two fifths length of snout; nostril circular, moderately enlarged; inter-orbital width about equal to an eyelid; surface of head smooth, the openings of skin glands scarcely evident save in a curved series on forehead, between and partly anterior to eyelids.

Gular fold with an irregular groove passing up on each side of head and meeting its fellow on the median line; on chin a groove arching forward (apparently without a groove at base); on each side of the base, a groove passes up across the angle of the jaw to the dorsal surface of the head, then turns diagonally backward and joins its fellow on the mid line somewhat in front of the nuchal groove; a dim groove runs from eye back to the nuchal groove on side of head; thirteen costal grooves; fold caused by the posterior extension of the hyoid cartilage reaching as far as the third costal fold; paravomerine teeth form a single elongate patch, widened and rounded posteriorly, coming nearly to a point anteriorly, separated from vomerine series by a short hiatus; vomerine teeth on two elevated ridges about eight on a side, narrowly separated mesially; maxillary teeth about 12-12 not reaching back as far as the middle of eye; six premaxillary teeth; about 16-16 mandibular teeth.

Adpressed limbs separated by six costal folds. Limbs small, weak, the hands and feet small; digits grown together rather than "webbed." Third finger proportionately very large, the pointed tip extending more than a third of its length beyond other fingers; tip of second finger free, while those of the first and fourth are not or scarcely free. Foot with the first and fifth toes not free; first joint of the second and fourth with terminal joint free; third toe proportionally large, the tip extending beyond other toes for nearly one third of its length.

Sides of the cloaca with smooth diagonal folds.

*Color:* Above brownish lavender, darker on the head, especially on upper eyelids, dorsally growing lighter to the base of the tail; a

very indefinite darker lateral line; lower part of sides as light or lighter than dorsum; under side of chin and abdomen light purplish with very numerous white or cream flecks; anal region light; tail dark with numerous lighter flecks or vermiculations. The small glandular spot behind insertion of leg scarcely discernible; white flecks below nostril and eye; a white line on tip of snout.

*Measurements:* Total length, 49.5; snout to vent, 28; snout to foreleg, 7.6; tail, 22; head width, 4.9; length of head to gular fold (ventral), 5; length to gular fold (lateral), 5.85.

*Remarks:* This specimen was taken near the base of a stump under bark in company with specimens of another undescribed species.

The absence of the enlarged glands on the back show that, while generically related, <sup>*parvumolge*</sup> ~~*truncate*~~ and *richardi* are widely distinct specifically. The bluntly pointed snout likewise is a differentiating character easily discerned.

The species is named for Richard Clark Taylor, its discoverer.

*Oedipina serpens* sp. nov.

*Type:* University of Kansas Museum of Natural History no. 23815 ♂; collected at Morehead Finca, 5 miles southwest of Turrialba, Costa Rica, July 21, 1947, by Edward H. Taylor.

*Diagnosis:* A very large species of the genus; snout to end of vent, 74.5 mm.; tail more than twice head-body length; width of head in head body length, 9.08 times; head length to gular fold (median), 6.1 times; snout rather elongate, truncate not "sharp"; eye small; snout strongly overhanging lower jaw; digits grown together, free at tip, and rounded; 8-9 costal folds between adpressed limbs.

*Description of the type:* Snout rather elongate, truncate, the dorsal surface curving without trace of canthus rostralis; median part of snout and interorbital region most elevated; eye very small, its diameter contained in snout length twice, or very slightly less; a small swelling below nostril on lip; posterior part of eyelids not tucked under a diagonal fold; nostrils very small, lunate in shape; width of upper eyelid in smallest interorbital distance, three times.

Gular fold strong, curving forward mesially; from sides of fold a nuchal groove runs up on side of neck but fails to meet its fellow on the middorsal line; a distinct postorbital groove runs back from the eye directed slightly downward, then straight back to beginning of nuchal groove; a groove crosses chin in front of the gular fold, passes behind angle of mouth and reaches to dorsal surface of occi-



put; a short groove about midway between this and the nuchal groove laterally terminating at postorbital groove; only a faint suggestion of an arched groove on chin; no orbitolabial groove; no median dorsal groove; costal grooves nineteen, traceable to midventral line, and to near middle of back; presumably a constriction at base of tail (tail severed); skin very smooth; limbs small, separated by nine costal folds when adpressed; arm adpressed reaches about two thirds distance to eye; fingers broad, grown together rather than "webbed," tips free with indistinct pads below; first finger without free tip, rather well developed; median finger rounded at tip; the other two fingers slightly narrowed at tip; toes very broad, grown together, the tips rounded, terminal joint free on all save inner, with small pads below tips; a white glandular spot behind leg insertion; walls of cloaca with very numerous papillae. Tail (severed and terminal portion missing) thick at base, tapering gradually; 52 + caudal grooves present.

Paravomerine teeth in two series narrowly separated mesially; vomerine teeth in two series, 15-16, which originate much outside outer level of choanae, run straight across mouth for greater part of their length, then curve back, separated from each other by a distance equal to space between four teeth and separated from the paravomerine series by only a slightly greater distance. Choanae small, their length contained in distance between them about five times; three premaxillary teeth piercing gums; maxillary teeth about 50-50; mandibular teeth about 55-55; a strong free sublingual fold.

Posterior extension of hyoid reaches to level of arm insertion.

*Color:* Dorsal and ventral color, grayish slate (under a lens the circular glands are whitish gray, the intervening space black); spots behind leg insertion bluish white; under surface of limbs somewhat brownish with some small whitish flecks; tip of snout with some indefinite lighter flecks; subnarial swellings and a minute line on edge of upper lip cream; lower eyelid and part of edge of upper whitish; medial area on chin brownish with cream flecks; hands and feet grayish on palms and soles.

*Measurements (in mm.):* Snout to posterior end of vent, 74.5; snout to arm insertion, 20; axilla to groin, 47; arm, 10; leg, 13.2; head width, 8.8; head length to gular fold (medial), 12; head length to gular fold (lateral), 15; width of body, 9; width of tail base, 7; length of tail, 136 (missing part estimated at about 50 mm.).

*Remarks:* The specimen was found under a log in rather soft mud

at the edge of a stream bank. It was especially active and elusive and escaped into a pile of large chips from which it was recaptured with considerable effort. The tail was broken and part lost, perhaps by my stepping on chips under which it was moving. Search was made for the lost portion of the tail but it was not found.

*Relationship:* The relationship apparently is with *Oedipina collaris* Stejneger. The following table of contrasting characters show the major differences between *collaris* and the one here described.

<i>Oedipina collaris</i>	<i>Oedipina serpens</i>
1. Snout sharp.	1. Snout blunt, strongly truncate.
2. Head width in head body length, 7.5 times.	2. Head width in head body length, 8.4 times.
3. Head length in head body length, 4.5 times.	3. Head length in head body length, 4.9—6.2 times.*
4. Skin granular.	4. Skin smooth.
5. Vomerine teeth about nine.	5. Vomerine teeth fifteen.
6. Vomerine teeth extend straight across mouth.	6. Vomerine teeth straight for part of series then curving back.
7. Fingers and toes short, scarcely flattened.	7. Fingers and toes long, strongly flattened.
8. Paravomerine (parasphenoid) teeth separated from vomerine teeth by half length of latter series.	8. Paravomerine teeth separated from vomerine teeth by one-third length of one of latter series.
9. Eleven costal folds between adpressed limbs.	9. Nine costal folds between adpressed limbs.
10. Last joint of the third and fourth toes free of membrane.	10. Last joints of second, third and fourth free of membrane.
11. Large dark preocular spot and a narrow black postocular streak.	11. These markings not present.

\* The gular fold curves strongly forward on middle of throat; head measured to this point, its length is 12 mm., to the side of head the measurement is 15 mm.

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